

CLAIMS

What is claimed is:

- 1 1. A method for fabricating a write pole tip for perpendicular recording, comprising:
 - 2 A) fabricating the P1, coils and P2 flux shaping layer;
 - 3 B) depositing the P3 layer on said P2 flux shaping layer;
 - 4 C) depositing a CMP stop layer on said P3 layer;
 - 5 D) depositing at least one sacrificial layer on said CMP stop layer;
 - 6 E) shaping said P3 layer into P3 pole tip;
 - 7 F) removing said at least one sacrificial layer to leave said P3 pole tip; and
 - 8 G) encapsulating said P3 pole tip in a encapsulating material.

- 1 2. The method of claim 1, wherein:
 - 2 said P3 layer material of B) is a material chosen from the group consisting of
 - 3 CoFe, CoFeN, NiFe, CoFe alloys, CoFeN alloys, NiFe alloys, Cr, Al₂O₃, and Ru.

- 1 3. The method of claim 1, wherein:
 - 2 said CMP stop layer material of C) is a material chosen from the group consisting
 - 3 of Al₂O₃ , Ta₂O₅, SiO_xN_y, Al₂O₃ alloys, Ta₂O₅ alloys, SiO_xN_y alloys, and insulation
 - 4 materials.

1 4. The method of claim 1, wherein:
2 said at least one sacrificial layer of D) comprises a sacrificial layer PS of
3 sacrificial material chosen from the group consisting of NiFe, NiP and plated materials
4 with high ion milling resistances.

1 5. The method of claim 4, wherein:
2 said at least one sacrificial layer of D) further comprises a seed layer of sacrificial
3 material.

1 6. The method of claim 5, wherein:
2 said PS layer is formed by creating a cavity surrounded by photo-resist material,
3 said cavity then being filled with sacrificial material.

1 7. The method of claim 1, wherein:
2 said shaping of said P3 layer of E) is done by ion milling.

1 8. The method of claim 7, wherein:
2 said ion milling is done to first produce a straight-sided structure, as said PS layer
3 masks said P3 pole tip, and then said CMP stop layer acts as a secondary mask as ion
4 milling is used to bevel the sides of said P3 pole tip.

1 9. The method of claim 8, wherein:
2 said beveled sides of said P3 pole tip are beveled to an angle with the range of 8
3 degrees to 15 degrees.

1 10. The method of claim 1, wherein:
2 said finished P3 pole tip has a width less than 200 nm.

1 11. The method of claim 1, wherein:
2 said removing of said at least one sacrificial layer of F) further comprises
3 removing said CMP stop layer.

1 12. The method of claim 11, wherein:
2 said removing of said CMP stop layer comprises using Chemical Mechanical
3 Polishing.

1 13. The method of claim 1, wherein:
2 said encapsulating material of G) comprises material matching that of said CMP
3 stop layer.

1 14. The method of claim 1, wherein:
2 said at least one sacrificial layer of D) comprises magnetic material; and
3 said removing said at least one sacrificial layer of F) requires that all of said
4 magnetic material of said at least one sacrificial layer be completely removed..